

CLAIMS

1. A process for applying one or more layers of protective resin to the outer surface of containers, especially bottles, comprising sending containers to a coating plant, conveying the bottles through the coating segment of said plant where the containers are dipped into a coating solution, removing said bottles from said solution, removing any excess coating from the outer surface of said bottles, removing the solvent of the solution from the coating, solidifying and curing the resin of the coating; the process comprising the following steps:
 - using a single bottle-transferring and conveying chain throughout the coating plant;
 - securing the bottles to said chain with specific grippers as soon as the bottles enter the coating plant;
 - conveying said bottles, held vertically by the gripping devices of said chain, to a coating segment comprising many tanks containing the coating solution; wherein said tanks are movable according to the feeding direction of the chain and sequentially, first, upward in order to each contain several bottles to be dipped into the coating solution at the same time, and, then, downward in order to remove the bottles from the coating solution;
 - Placing around the bottles, when removed from the coating solution a protective guard, and, then, spinning the bottles in order to eliminate the excess paint;
 - Turning the bottles into the horizontal position;
 - Rotating the bottles slowly around their axis in order to obtain a paint with uniform thickness;
 - Sending the bottles to specific segments of the plant in order to dry the coating and, then, curing the coating.
2. A process as claimed in claim 1 wherein the bottles are secured to the single conveying chain by means of grippers, which are evenly spaced along the chain, that grip the bottles by the neck placing them in a vertical position.
3. A process as claimed in claim 2 wherein said gripping devices can be rotated on a plane that is perpendicular to the feeding direction of the chain, in order to place the bottles in the horizontal position.

4. A process as claimed in claim 1 wherein, after the bottles being transported by the chain reach the tanks containing the coating solution, there is provided the step of raising the tanks one by one in order to contain each several bottles to be coated, while, at the same time, also moving horizontally the tanks, whereby this movement is synchronized with the translation movement of the bottles to be coated.
5. A process as claimed in claim 4 wherein the bottles are dipped into and removed from the coating solution at a speed between 50 and 200 mm/s.
6. A process as claimed in claim 4 wherein the total dipping time of the bottles in the coating solution is preferably less than 0,6 s.
7. A process as claimed in claim 1 wherein there is provided, after removal from the coating tanks, the bottles remaining in the vertical position, a protective guard being raised around the bottles, and the bottles being spun at a speed of rotation comprised between 500 and 5000 revolutions per minute.
8. A process as claimed in claim 7 wherein said speed is comprised between 500 and 3000 revolutions per minute.
9. A process as claimed in claim 7 wherein centrifuging time is comprised between 1 and 3 seconds.
10. A process as claimed in claim 1 wherein there is comprised the step, after leaving the centrifuging area and being positioned horizontally, of rotating the bottles slowly at a speed included between 100 and 300 revolutions per minute.
11. A process as claimed in claim 1 wherein, after drying and/or curing the paint, there is provided applying a second coat of paint to the bottles, subsequently centrifuging, drying, and/or curing, as before.
12. A coating plant comprising:
 - (i) A single device (100) for conveying bottles (B), or containers, throughout the plant; this conveyor being provided with a chain (101) and evenly distributed gripping devices (102), which grip the bottles (B) in a loading station (10), and are able to rotate on a plane perpendicular to the feeding direction of the conveying device in order to place said bottles (B), or containers, from a vertical position in a horizontal one;

- (ii) A coating plant (20), located after the bottle-gripping station (10), comprising many paint-filled tanks (22) placed under a wheel or rotating drum (20.1) – around which said device for conveying the bottles winds around in order to change feeding direction, the movement of said tanks being synchronized with the movement of said wheel or drum (20.1), and also comprising going up or down so that several bottles (B) can be dipped into and removed from each tank;
- (iii) Devices suitable to spin said bottles for a preestablished amount of time, and devices adapted to surround each bottle with a protective guard;
- (iv) Devices suitable to rotate said gripping devices on a plane perpendicular to the feeding direction in order to place the bottles from a vertical position in a horizontal position;
- (v) Devices (50) for drying the paint, and devices (70) for curing the resin contained in the paint;

13. A plant as claimed in claim 12 comprising:

- (i) A loading area (10) that the bottles reach after being conveyed by a conveyor (1) where the bottles are loaded vertically onto a means of transport (100);
- (ii) A coating area (20) where the bottles (B) are coated through dipping, and then spun to remove any excess paint;
- (iii) An area (40) where the bottles are placed in the horizontal position;
- (iv) An area (50) for drying the paint still on the bottles (B) where the remaining solvent is completely removed;
- (v) An area (70) for curing the resin contained in the paint followed by a first area (40') for placing the bottles from the horizontal position in the vertical position.

14. A plant as claimed in claim 13 wherein, after said first area (40'), there are provided the following areas, organized and functioning in the same way as the previous ones: another coating station (20') for applying a second layer of paint and removing any excess paint through centrifuging, an area (40'') for placing the bottles from the vertical position in the horizontal position, a paint-flow area (50'), and a paint curing area.

15. A plant as claimed in claim 13 wherein, in the coating area (20), the conveying means (100) – which is made up of a chain (101) equipped with gripping devices (102) that each grip the neck of a bottle (B) – winds around a rotating wheel (20.1) under which there are many tanks (22), which also have a movement that is synchronized with the one of said wheel (20.1); each tank is filled with a coating solution, and is able to contain several bottles.
16. A plant as claimed in claim 14 where said tanks (22) are supplied with paint by means of a communicating-vessel device (21, 23) controlling the level of the paint in the tanks.
17. A plant as claimed in claim 14 wherein said tanks (22) are supplied with paint by means of a rotating-joint device controlling the level of the paint in the tanks.
18. A plant as claimed in claim 14 wherein each tank (22) is equipped with a nonreturn valve (27) preventing paint from flowing out of the tanks when these are raised to contain several bottles.
19. A plant as claimed in claim 14 wherein said tanks (22) are supplied with paint by means of a combined pump and rotating-joint device that controls the level of the paint in the tanks, which are equipped with an overflow device.
20. A plant as claimed in claim 11 wherein the bottles are placed from the vertical position in the horizontal one, and vice versa, by bending the chain (101).